The 1st Conference on Positive Youth Development in a Cross-national Perspective

Positive Youth Development
Cross-national

Workshop 2: Factor Analysis and Measurement Invariance

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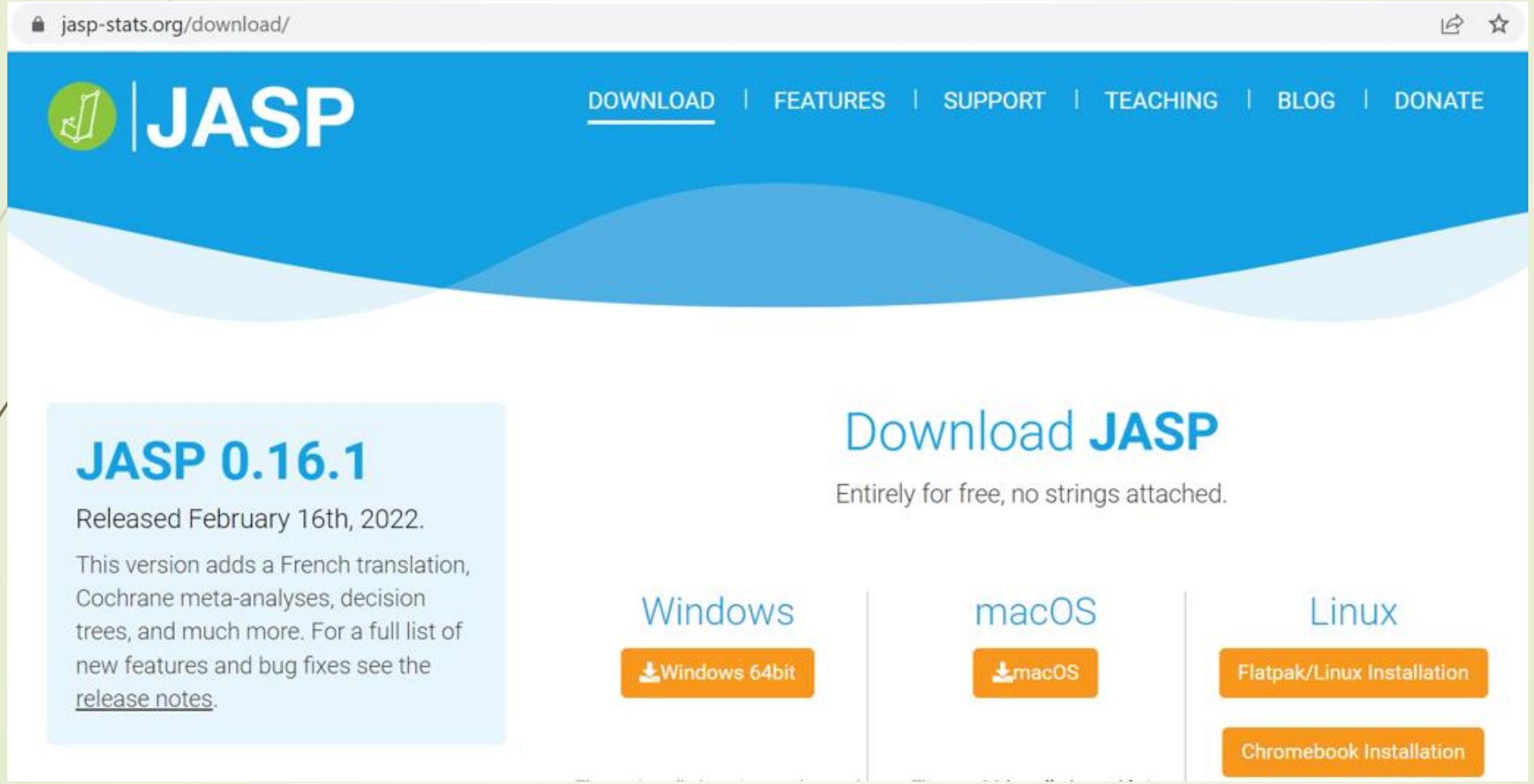
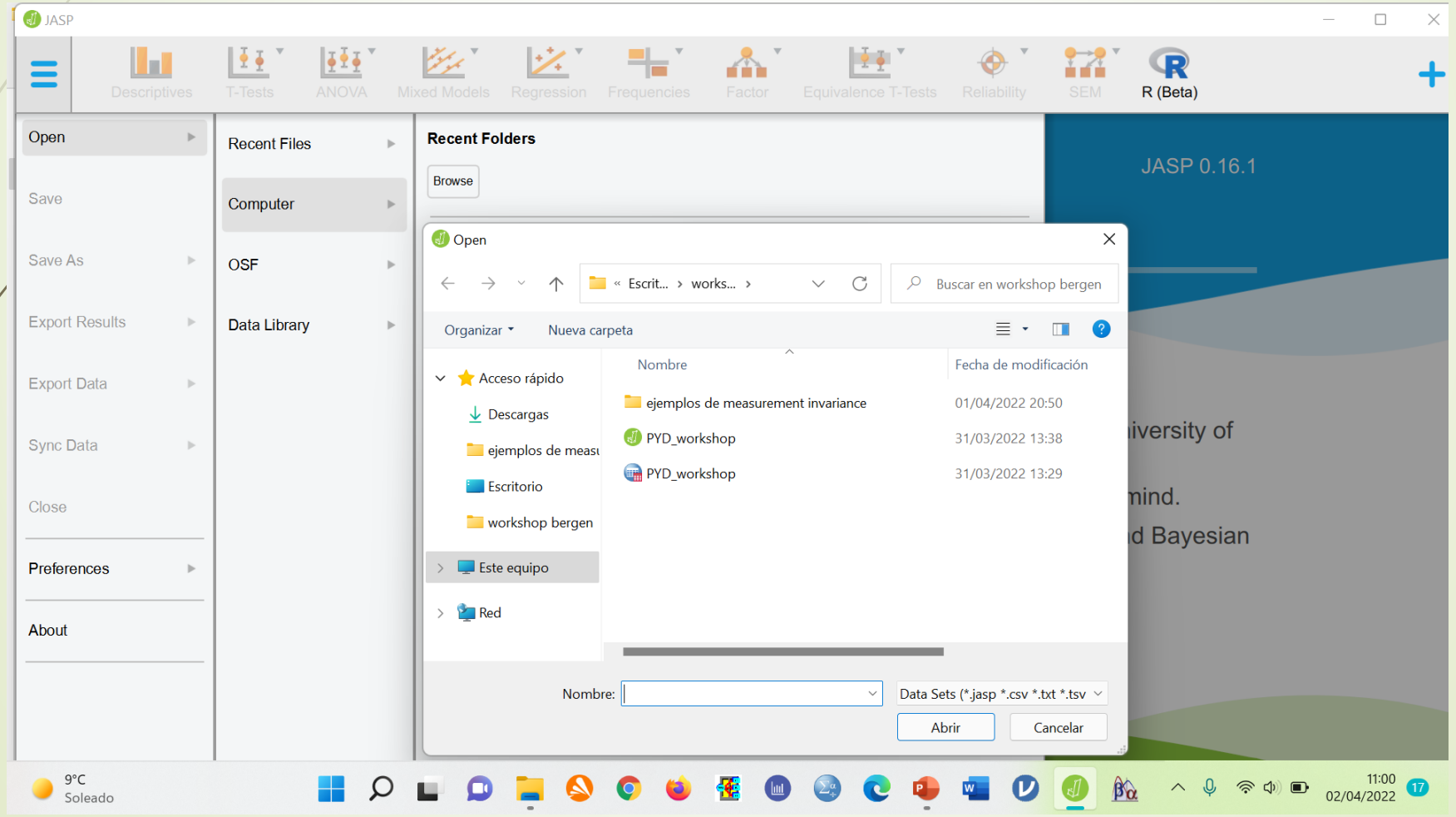
Part 1

JASP statistical package



Starting with Jasp

- Open, Computer, Browse. Then, select the .sav or .xls file.
- You can sabe the new jasp data file.



Descriptive statistics

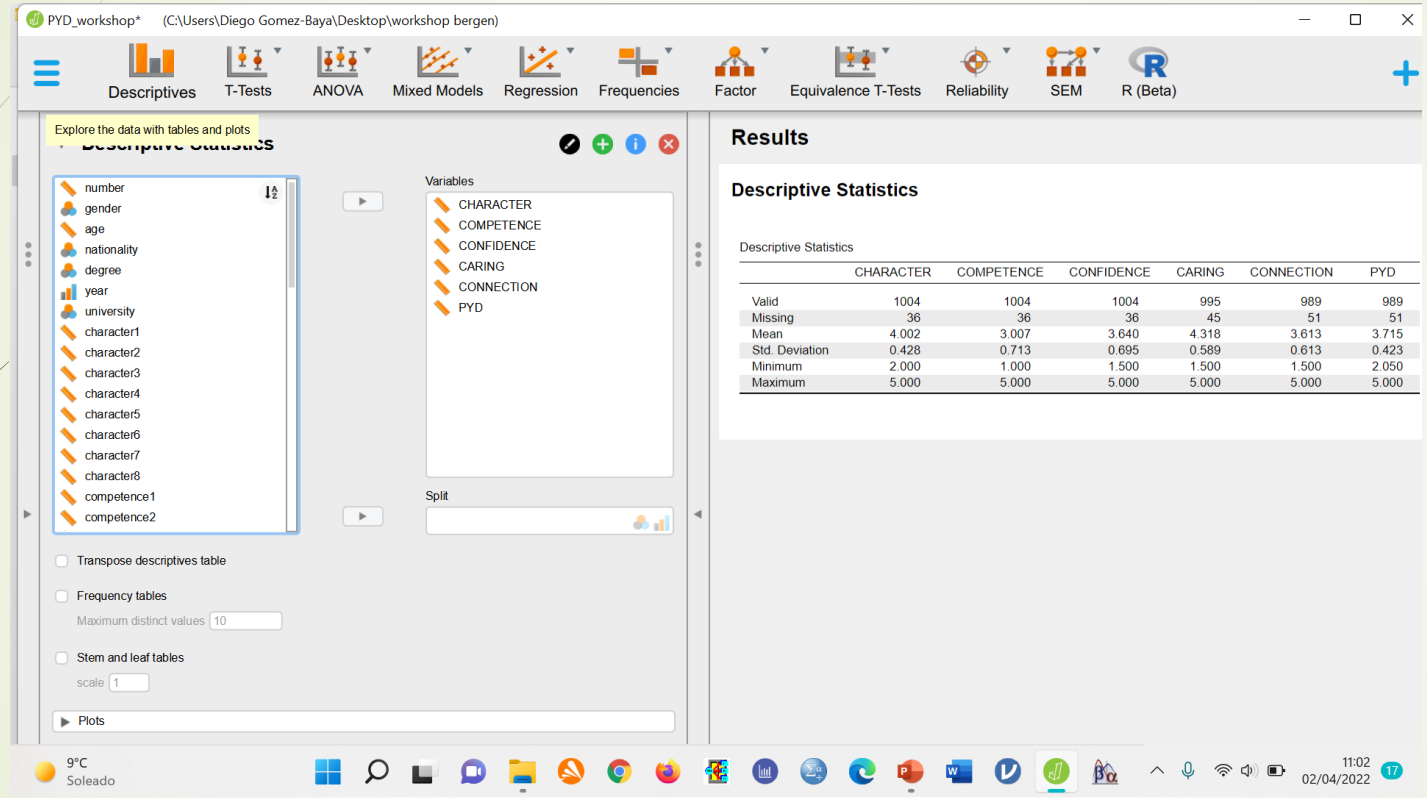
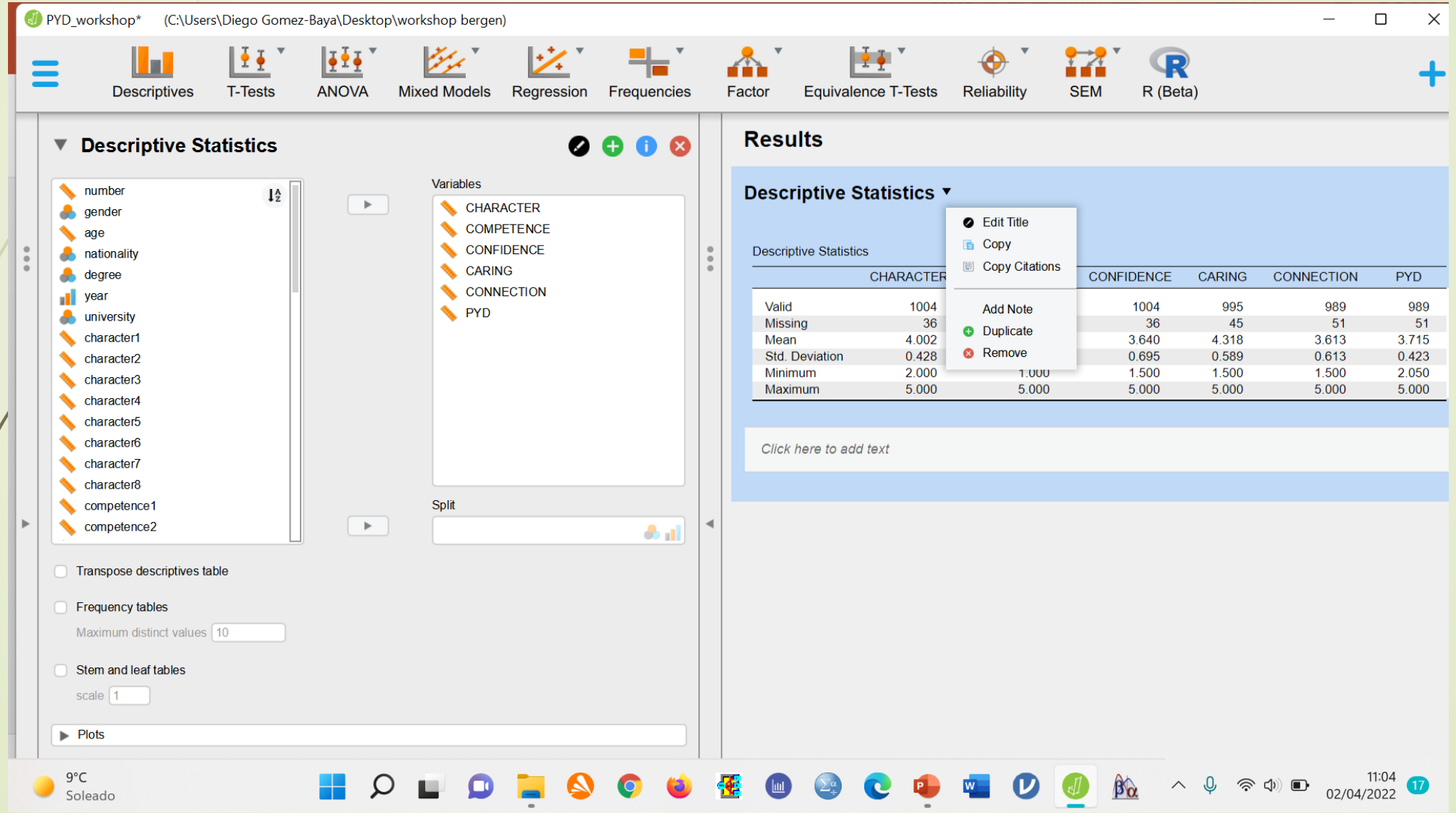
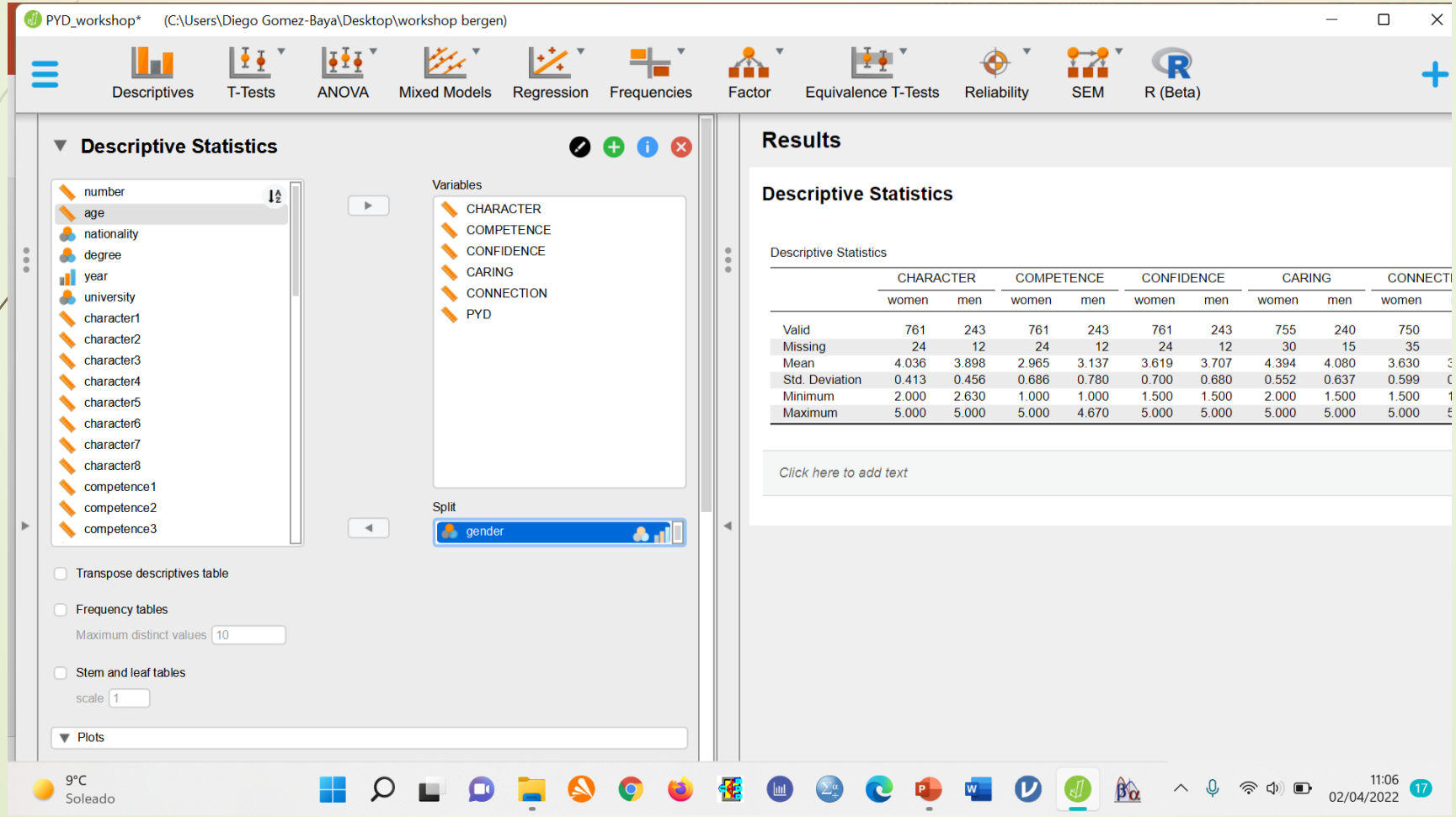


Table 1 shows descriptive statistics of the 5Cs and the overall score in PYD. The scores could range between 1 and 5, so that mean scores over 3 indicate a positive development of the dimension. Moderate to high mean scores were observed in the 5Cs. The highest scores were found in caring and character, while the lowest was observed in competence.

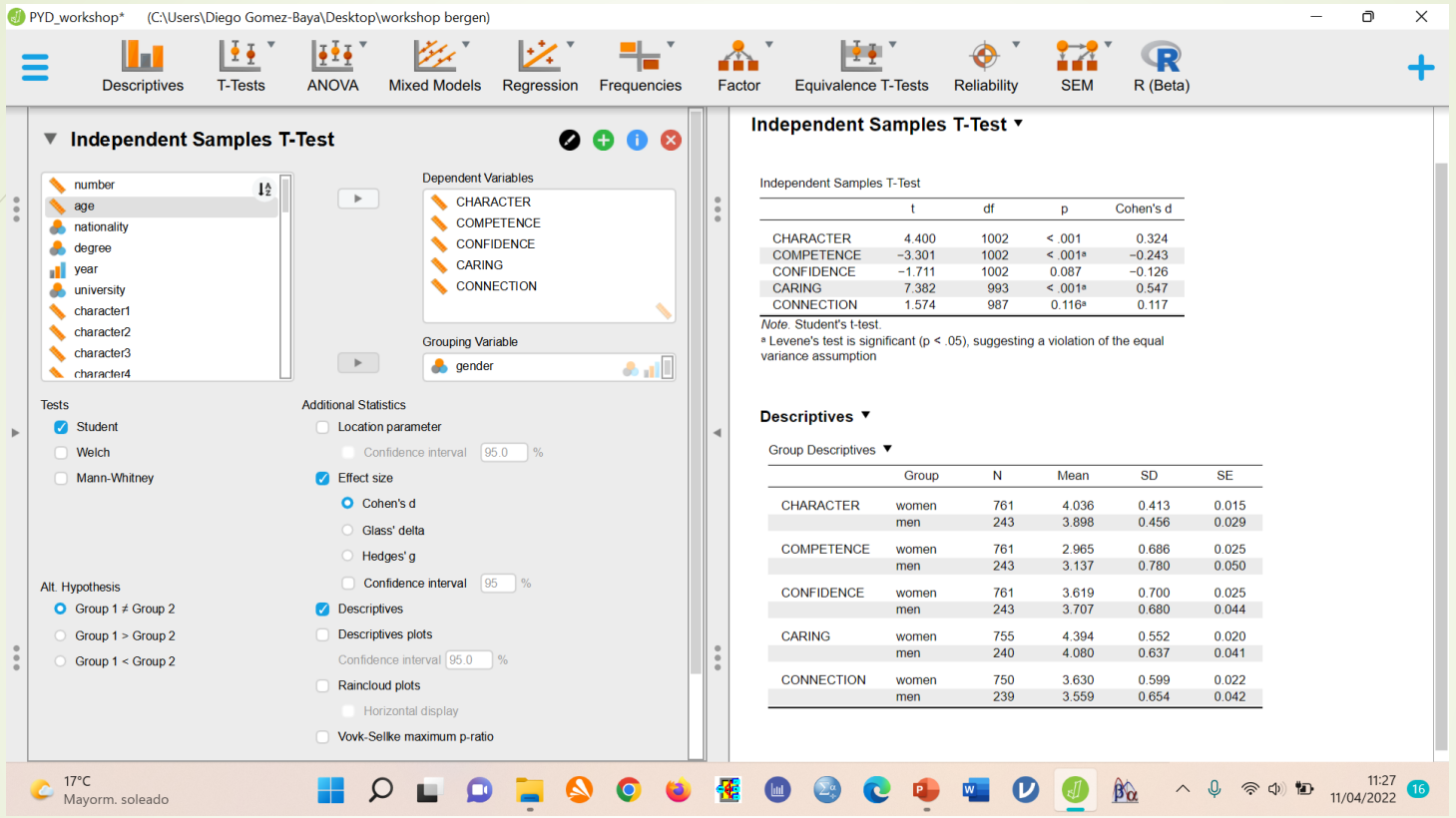
Export tables in APA format



How to Split the sample in descriptive stats



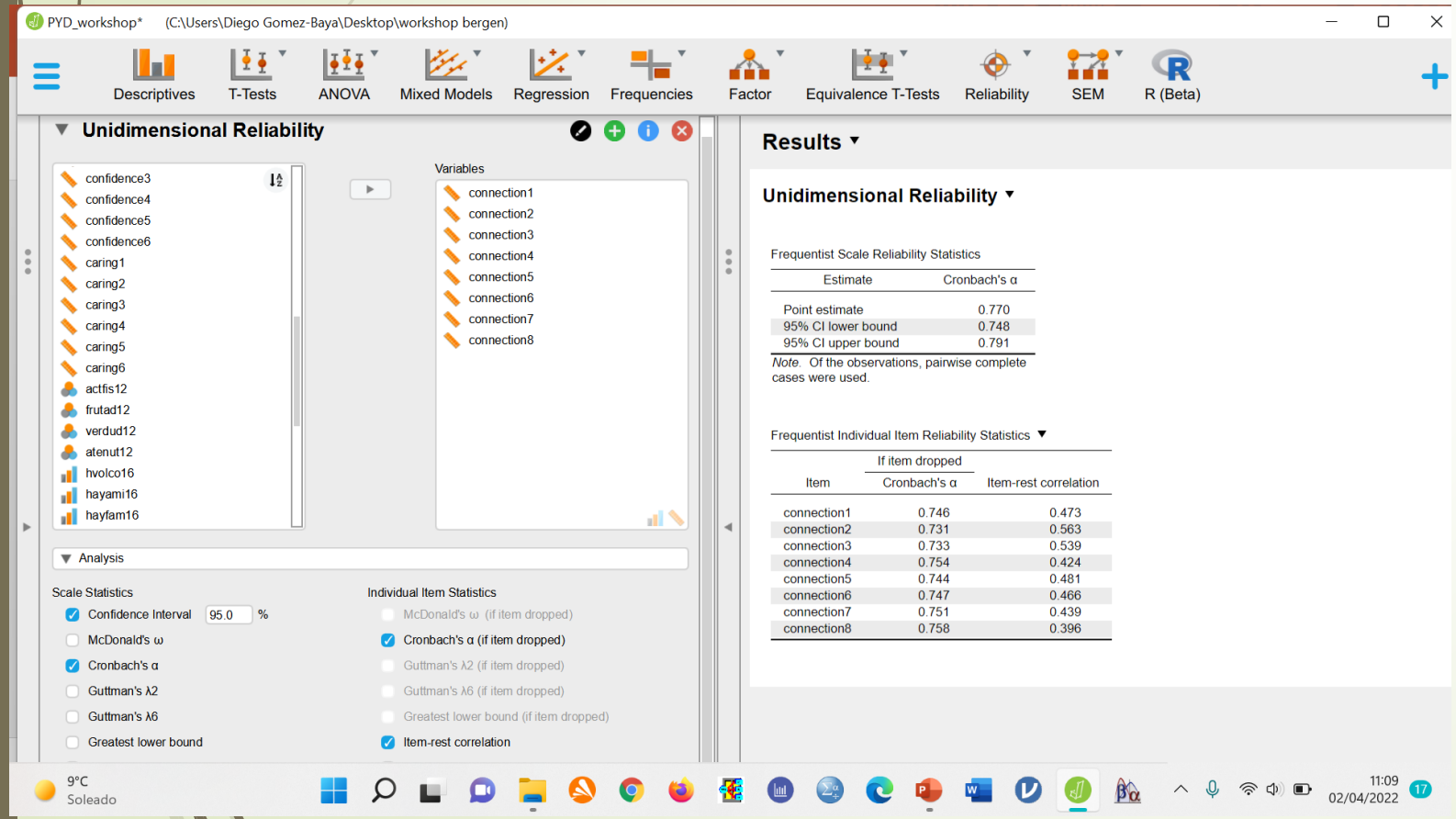
T-tests



- T-Tests, Independent simples t-tests, select variables, grouping variable: gender, Tests: Student, Effect size: Cohen's d, Descriptive.
- Some gender differences were observed in some PYD dimensions. Men presented greater scores in competence, $t(1002) = -3.30$, $p < .001$, $d = .244$, while women showed more character, $t(1002) = 4.40$, $p < .001$, $d = .324$, and more caring, $t(993) = 7.38$, $p < .001$, $d = .547$.

Reliability: Internal consistency

- With the items of each subscale we can calculate the internal consistency:
- Reliability, Classical, Unidimensional reliability. Include the items and select Cronbach Alpha, Cronbach Alpha (if item dropped) and item-rest correlation



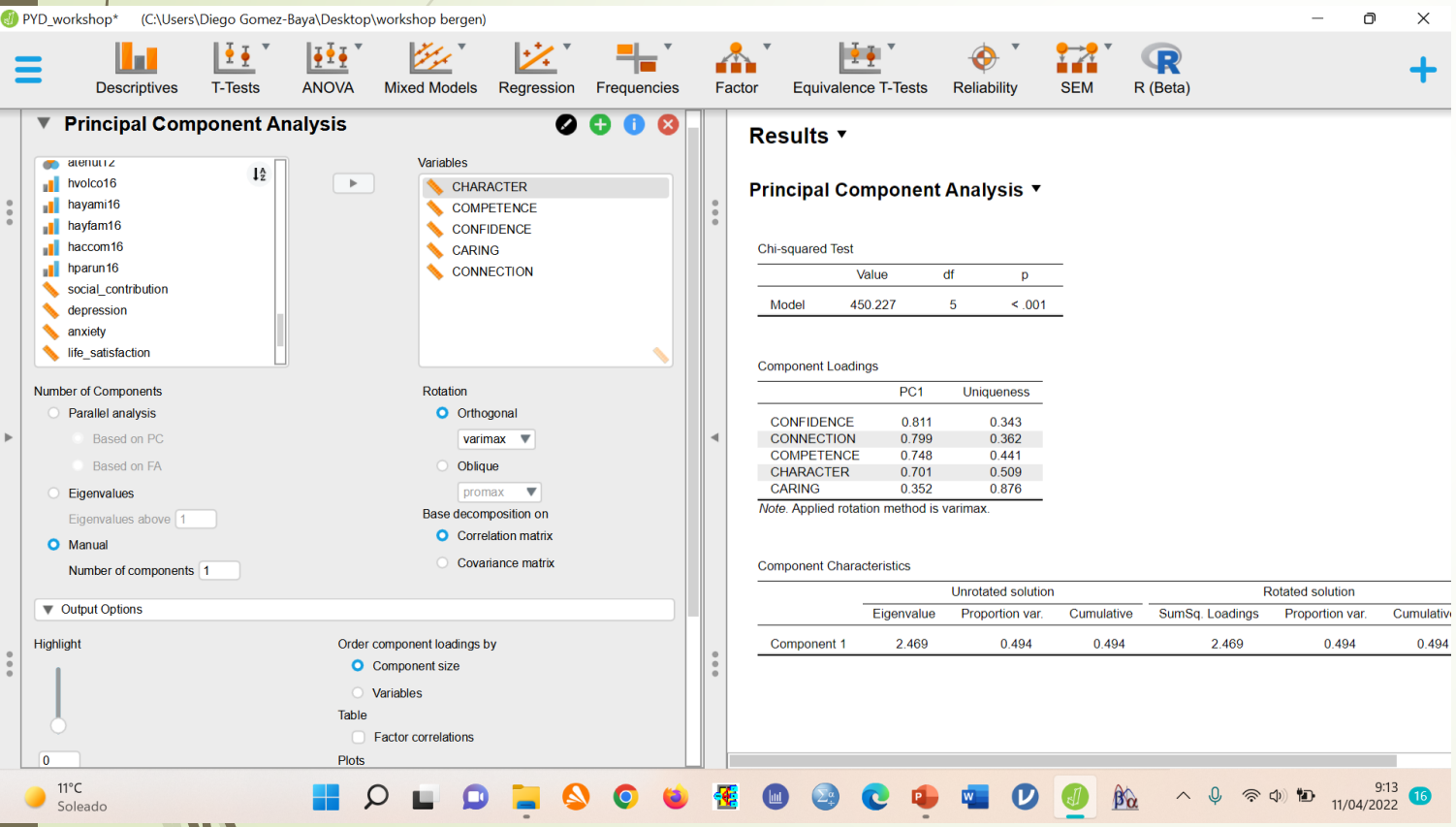
Concerning reliability, aceptable internal consistenty was detected in the dimensión of connection (α = .77). All correlations between the separate ítems and the rest of the scale are high and positive. Alpha score did not improve after removing any indicator.

Cronbach's Coefficient Alpha (α)	Reliability
0.80 to 0.95	Very Good
0.70 to 0.80	Good
0.60 to 0.70	Fair
< 0.60	Poor

Source: Sekaran & Bougie (2010)

Exploratory factor analysis

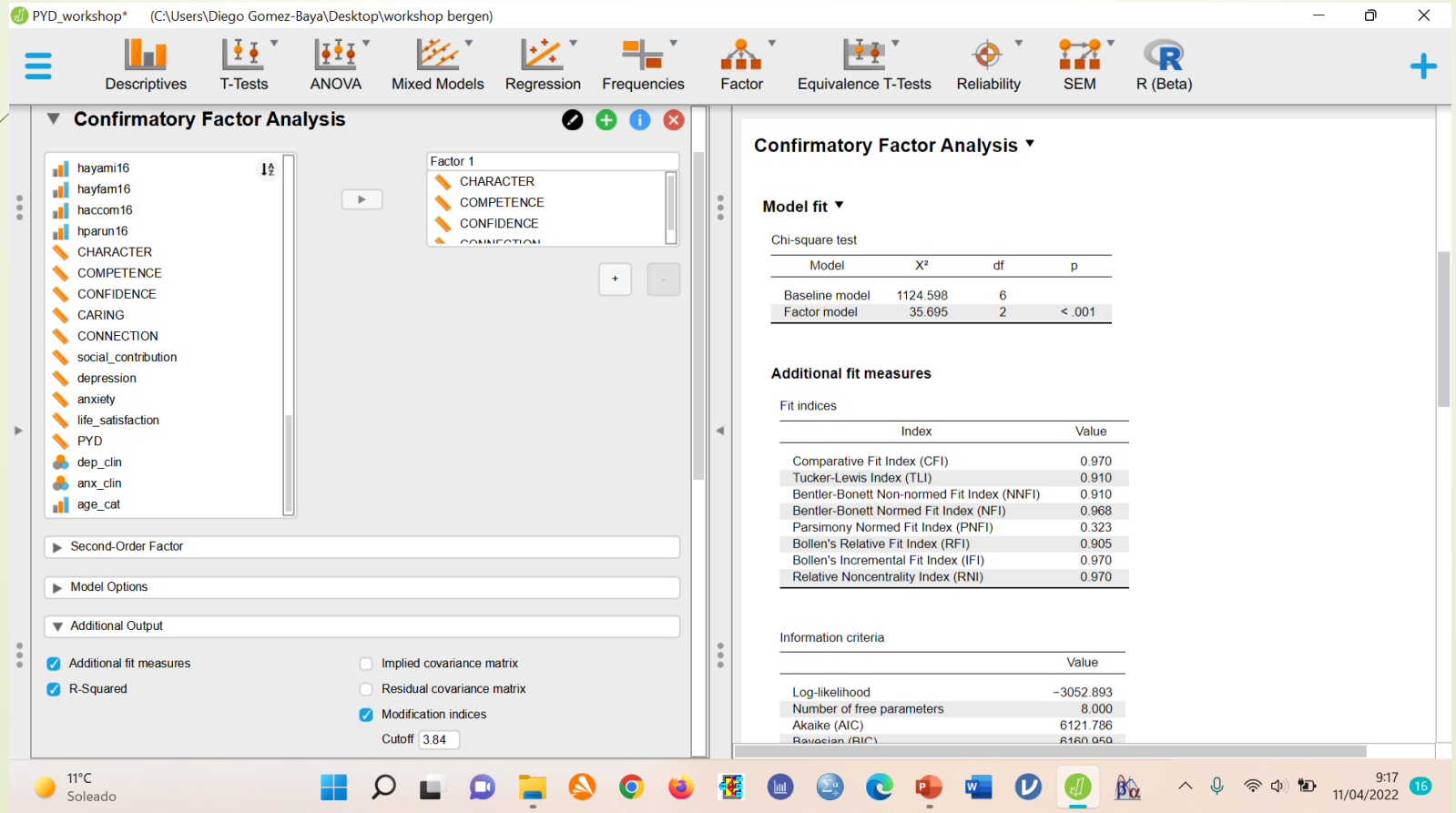
- Factor, Principal component analysis, select the variables, Rotation (Orthogonal, Varimax), Manual: Number of factors:1, Highlight =0:



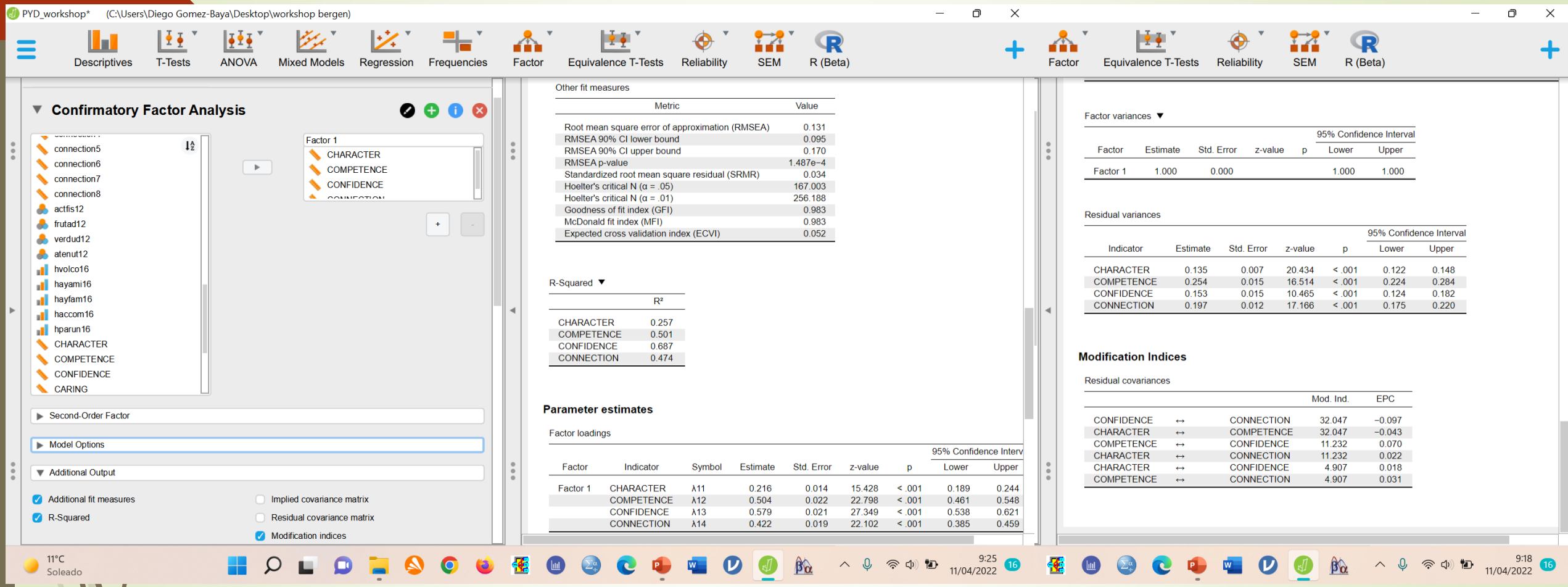
Principal component analysis was conducted, $\chi2(10) = 450.23$, $p < .001$. The results indicated one factor with high percetage of explained variance (Eigenvalue = 2.47, % explained variance = 49.4). Four variables showed components loading over 0.70, while caring presented a very low loading. The PYD factor could be composed of four dimensions.

Confirmatory factor analysis

- Factor, Confirmatory factor analysis, Select variables (confidence, connection, competence and character), Additional output (additional fit measures, R squared, modification indices)

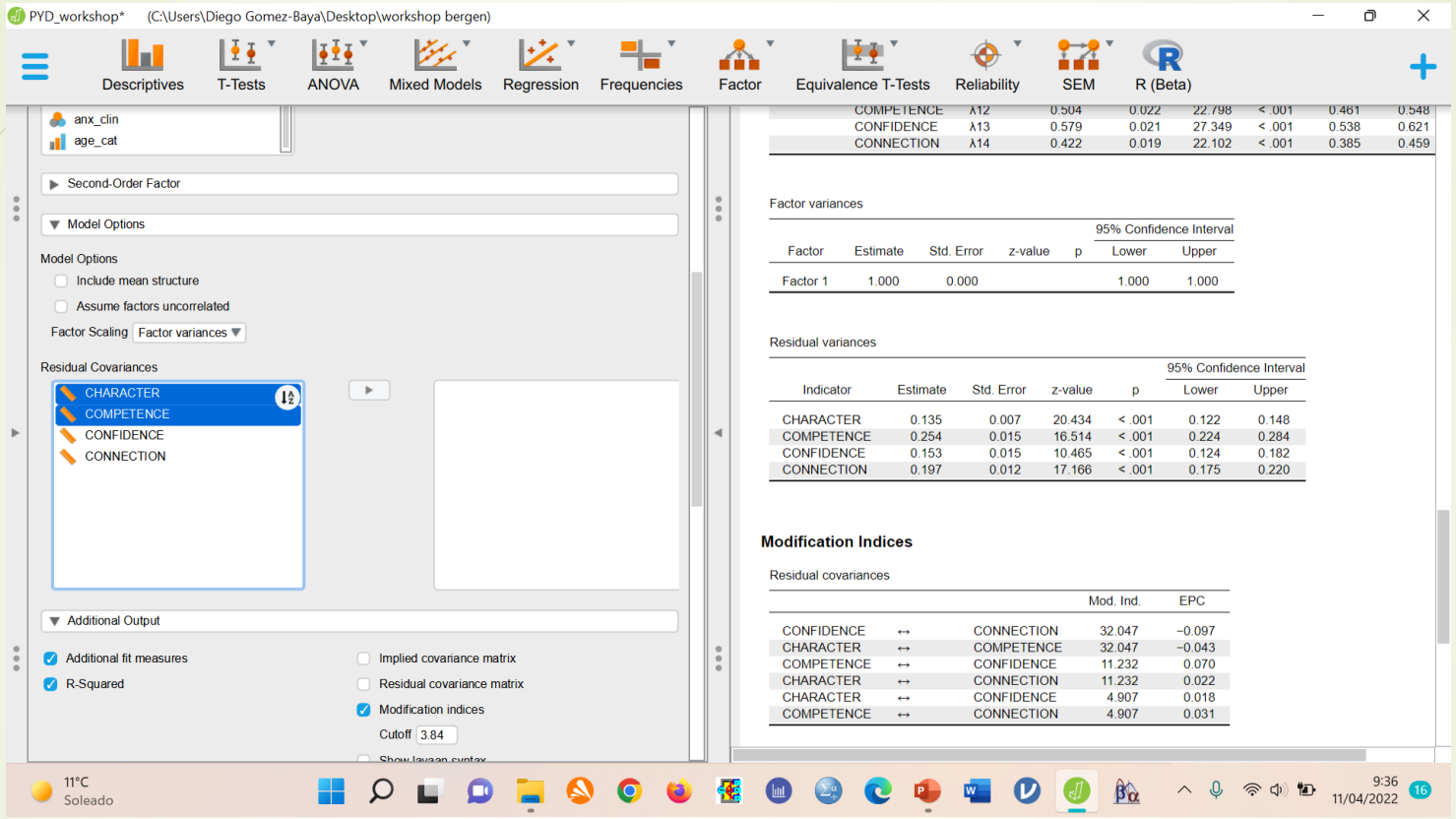


Confirmatory factor analysis



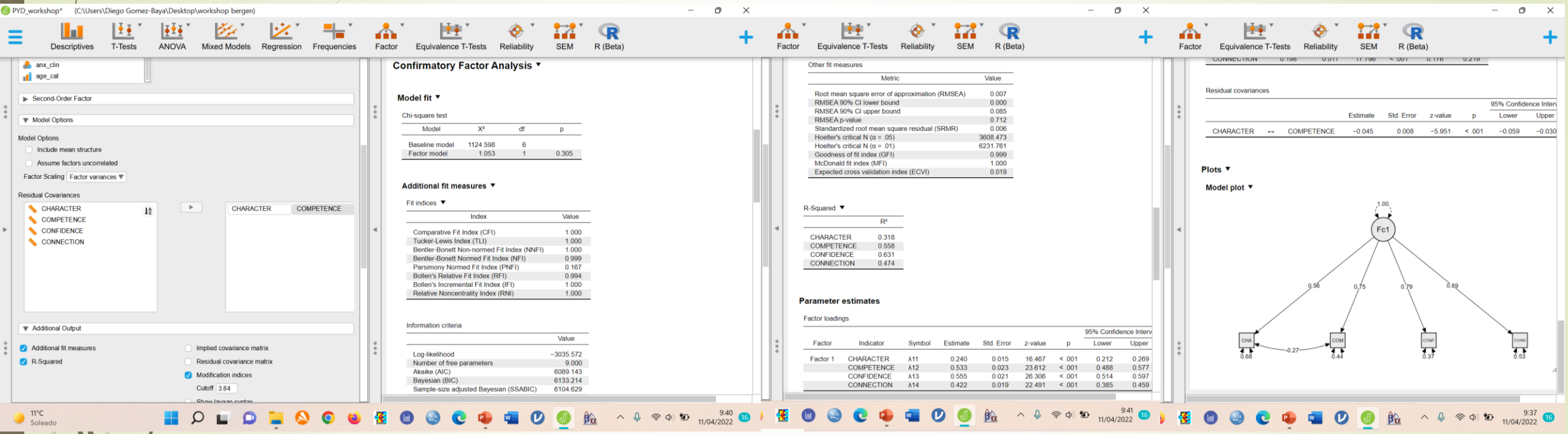
- Confirmatory factor analysis was performed with four components of PYD, as indicated by previous analysis (i.e, competence, confidence, connection and character). Poor data fit was observed in some indices, $X2(2) = 35.70$, $p < .001$, CFI = .970, RMSEA = .13. Modification indices suggested a residual covariance between character and competence.

Confirmatory factor analysis



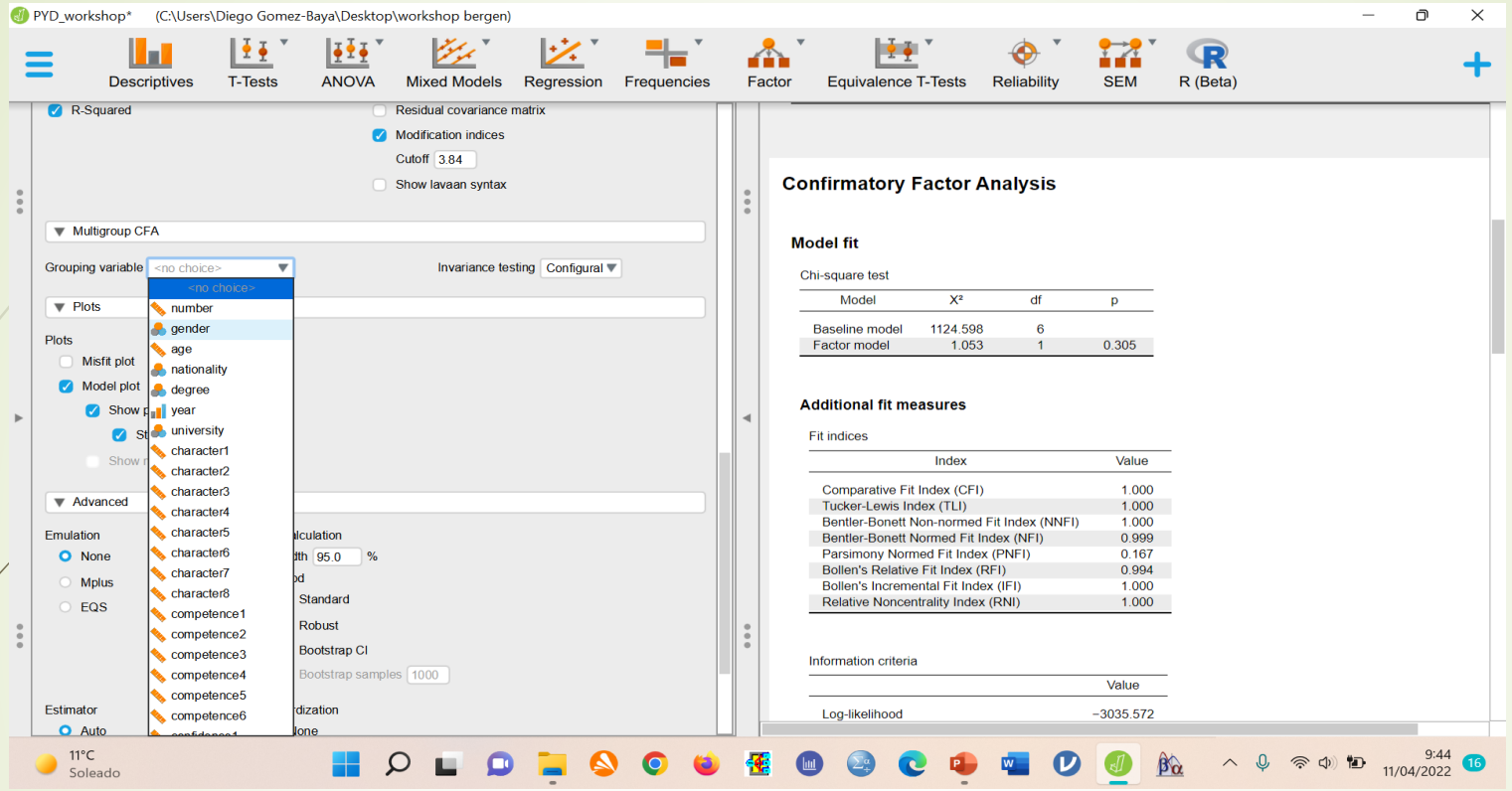
- Model options: Residual covariances: Select the pair of variables
- Plots, model plot, standardized

Confirmatory factor analysis



- After the modification, the model improved the data fit and reached aceptable values, x2(1) = 1.05, p = .305, CFI = 1, RMSEA = .007, 90% CI RMSEA = .000 - .085, SRMR = .006. Standardized solutions showed Good factor loadings by competence (β = .75) and confidence (β = .79), and moderated ones by connection (β = .69) and character (β=.56). Residual covariance between competence and character was significant (β = -.27). A four factor model of PYD reached good data fit.

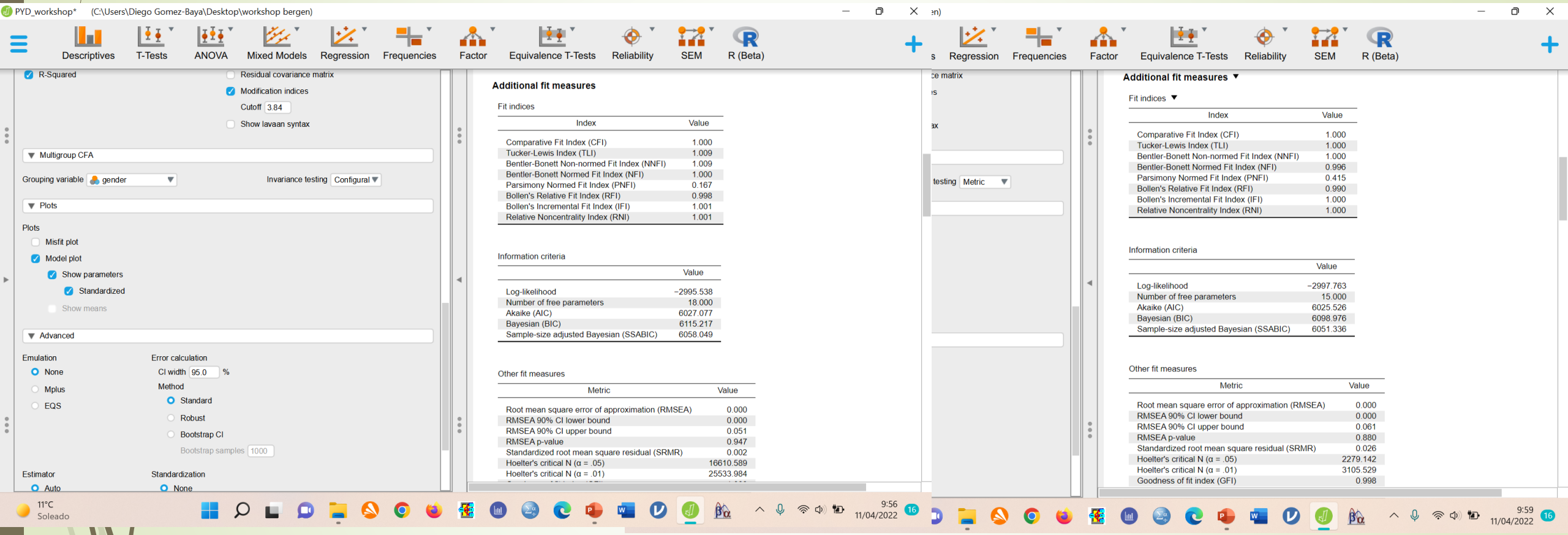
Measurement invariance



- Multigroup CFA, Grouping variable (select gender, for example), Invariance testing:
  - Configural: Same structure across groups
  - Metric: same factor loading across groups
  - Scalar: same intercepts across groups
  - Strict: same residual variances across groups

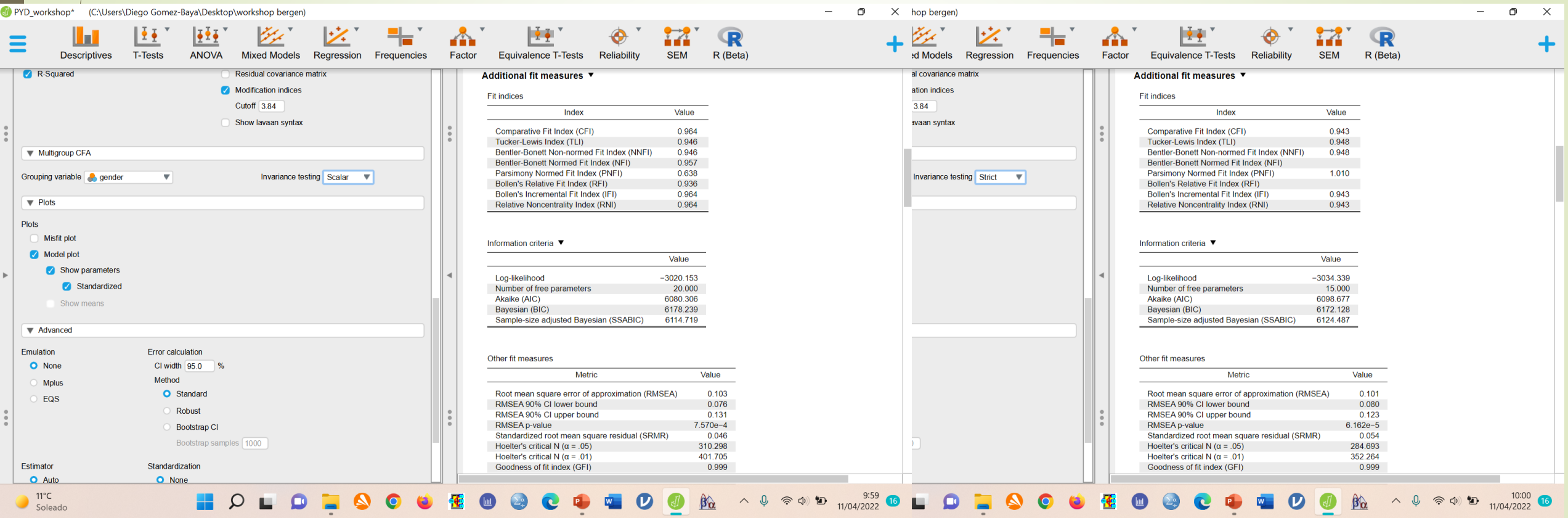
Chen (2007) suggested a criterion of a -.01 change in CFI, paired with changes in RMSEA of .015 and SRMR of .030 (for metric invariance) or .015 (for scalar or residual invariance). Strict measurement invariance is not considered necessary in cross-cultural research.

Measurement invariance



- No remarkable differences by gender were observed in the structure and factor loadings.

Measurement invariance



- Remarkable differences were found in the intercept (ΔCFI = .036, ΔRMSEA = .103, ΔSRMR = .041) and in the residual variances (ΔCFI = .057, ΔRMSEA = .101, ΔSRMR = .049). Thus, the model showed measurement invariance at configural and metric level, while differences were detected in scalar and strict analyses.